2009 Climate Summary For Southwest Michigan

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Of the past 115 years with records available, 2009 was the 14th wettest and 36th coldest for Southwest Lower Michigan. The cooler than normal trend continued from 2008. Season by season, it was the coolest year since 2004. Snowfall was above normal across all of Southwest Lower Michigan.

Severe weather was very inactive for both the entire state of Michigan and locally in Southwest Lower Michigan. For the entire state of Michigan, the total of three tornadoes in 2009 was the lowest yearly total since 1970. The three tornadoes reported in 2009 for the state of Michigan all occurred on June 19th around 9 PM in Allegan and Kalamazoo Counties. The strongest was rated EF2 in Allegan County.

In the 23 counties in the Grand Rapids County Warning Area (CWA), there were 42 reports of severe weather in 2009. Of these, 35 of them occurred in the summer months. The past 10 years have averaged ninety events during the summer. This tied the all time record set in 1990 (for the 1986 through 2009 period of record) for the fewest total severe storm events in the Grand Rapids CWA. In contrast to the inactive severe weather in 2009, it should be noted that in 2008, the all time record maximum number of severe events was set at 231.

The year started out with a cold and snowy pattern well underway. It was the third winter in a row with above normal snowfall. The pattern came to an abrupt end in late in February. Of the fourteen warning class winter storms in the 2008/2009 winter season, twelve of those winter storms occurred before the first day of February. Area wide, it was the coldest winter since 2002/2003, which was only a few tenths of a degree colder than the 2008/2009 winter. Both the 2002/2003 and 2008/2009 winters were around two degrees below normal. Those were the only winters of the decade to average colder than normal. The last winter significantly colder than 2008/2009 was in 1993/1994, which was over four degrees colder than normal.

The spring of 2009 was very wet, especially over areas near and south of Interstate 96. Since 1998, only the springs of 2005 and 2008 were drier than normal. As a result, the spring of 2009 continued the decadal trend of wet springs. The heavy rainfall and melting snows caused river levels to be well above normal from mid February into late April. Near record crests were reported on some area streams and rivers. This resulted in significant flooding

problems for those located near the larger rivers like the Grand and Kalamazoo. While temperatures were near normal in terms of daily mean temperatures, there was a marked lack of warm temperatures with near record minimum number of days with highs of 80F or warmer.

This was the fourth coldest summer for Southwest Lower Michigan since records began in 1895. The coldest summer on record was the summer of 1992, which averaged 64.0 degrees. Three of the top five coldest summers have occurred in the past 20 years. July averaged cooler than June, something that rarely happens. The frequency of highs above both 80 degrees and 90 degrees were in the top ten lowest on record across the area. August was the warmest month of the summer but even so, it could hardly be called a warm month. Rainfall continued to be abundant, with June being the wettest month.

Fall of 2009 was the only season to be warmer and drier than normal. Severe storms and snowfall were nearly non-existent. The decade long trend for warmer than normal temperatures and drier than normal conditions in the fall continued in 2009. In the previous ten falls, only three were colder than normal. In the past fifteen years, only four of the falls were wetter than normal.

TABLE 1. Reported temperature, precipitation and snowfall amounts for 2009 at selected climate stations in Southwest Lower Michigan. Normals are computed from 30-year averages from 1971-2000.

Location		Temperature (F)	Precipitation (inches)	Snowfall (inches)
Grand Rapids	*Reported*	48.0°	42.85	76.4
	Normal	47.6°	37.13	72.2
	Departure	+0.4°	+5.72	+4.2
Lansing	*Reported*	47.0°	38.11	45.6
	Normal	46.8°	31.53	54.5
	Departure	+0.2°	+6.58	-8.9
Muskegon	*Reported*	47.3°	38.17	98.4
	Normal	47.1°	32.88	105.5
	Departure	0.2°	+5.29	-7.1

Temperature Trends in 2009:

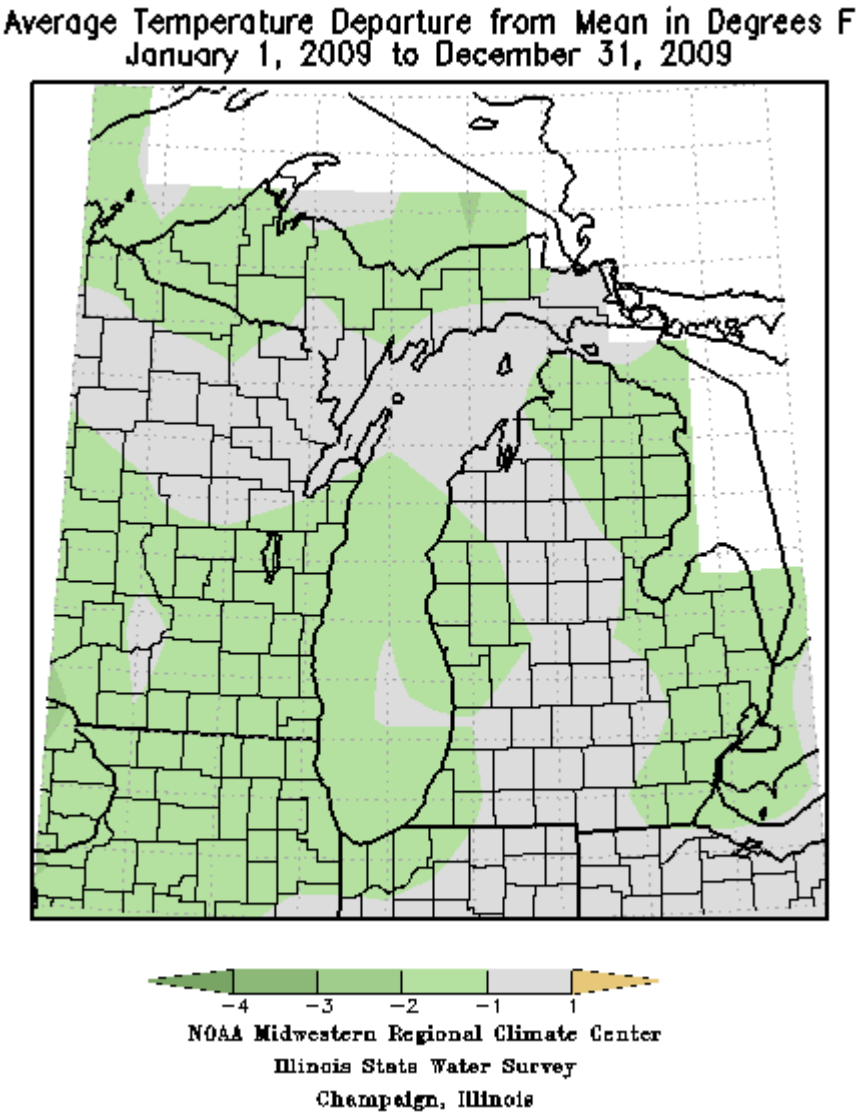

Figure 1. 2009 Temperature departure from normal.

The average temperature for the 36 long term climate stations in Southwest Lower Michigan was 46.3°. That was 0.3° below the normal mean of 46.8°. Most of Southwest Lower Michigan was between a half degree and one degree below normal (Figure 1). The last time Southwest Lower Michigan averaged colder than normal was in 1997 when the area average was 45.7°. Looking at Figure 2, it can be seen that for the most part, colder than normal temperatures dominated Southwest Lower Michigan's weather from 1958 through 1997. Since 1997, most years have been warmer than normal.

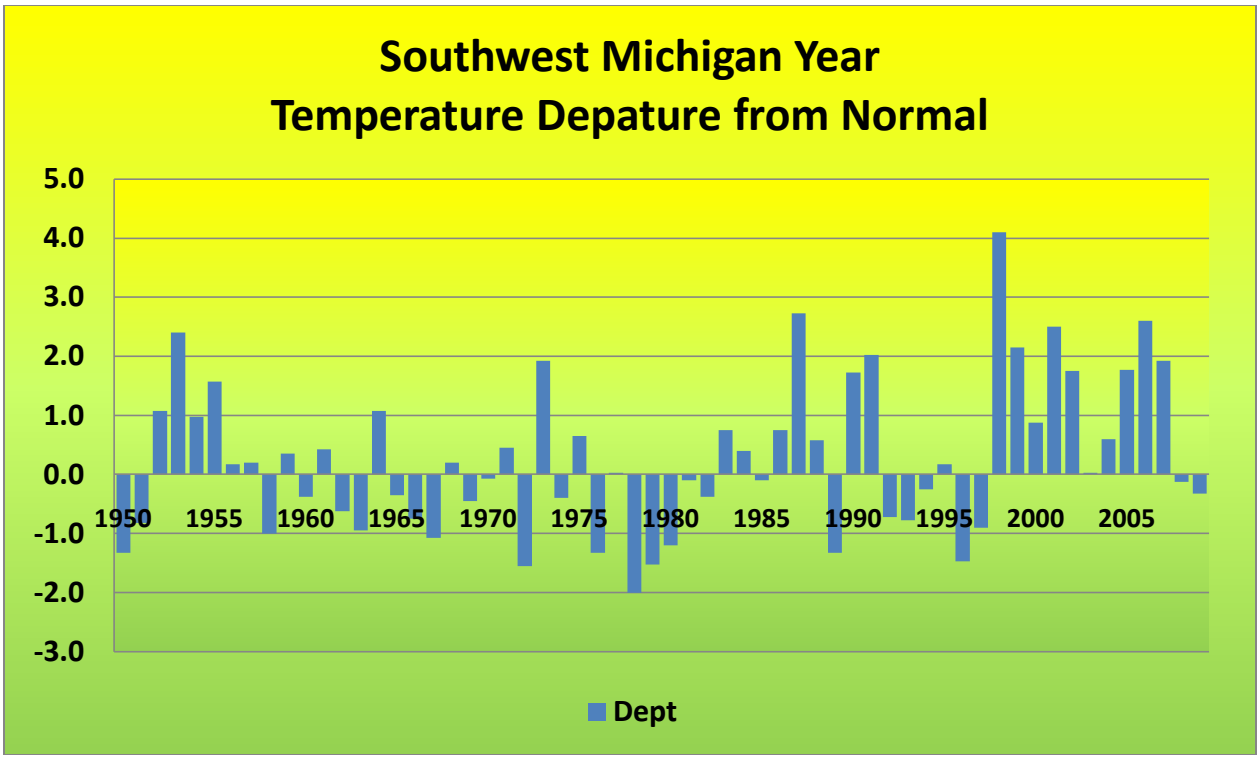

Figure 2. The graph above shows the mean area temperature departure from normal for all of Southwest Michigan, from 1950 through 2009. There were thirty six climate stations used to come up with the yearly mean temperature.

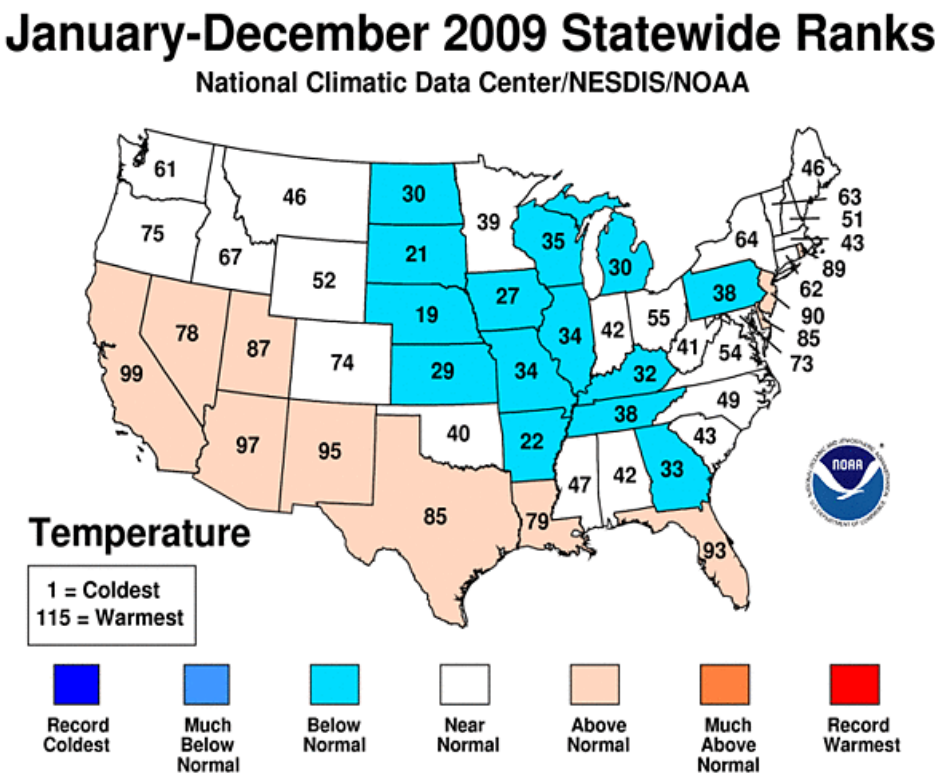

Figure 3. NCDC state temperature rankings for 2009. Numbers indicate the rank relative to the 115 years of available climate data.

Michgan had its 30th coldest year since records began in 1895 (Figure 3). For Southwest Lower Michigan, this was the 36th coldest year on record. The coldest year for Southwest Lower Michigan was 1917 with a mean of 43.3 degrees, The coldest recent year was the 1996 with a mean temperature of 45.1 degree, that was the seventh coldest year on record. The past ten years averaged 47.7 degrees or nine tenths of a degree warmer than normal. Both 2001 and 2006 are in the top ten warmest years on record.

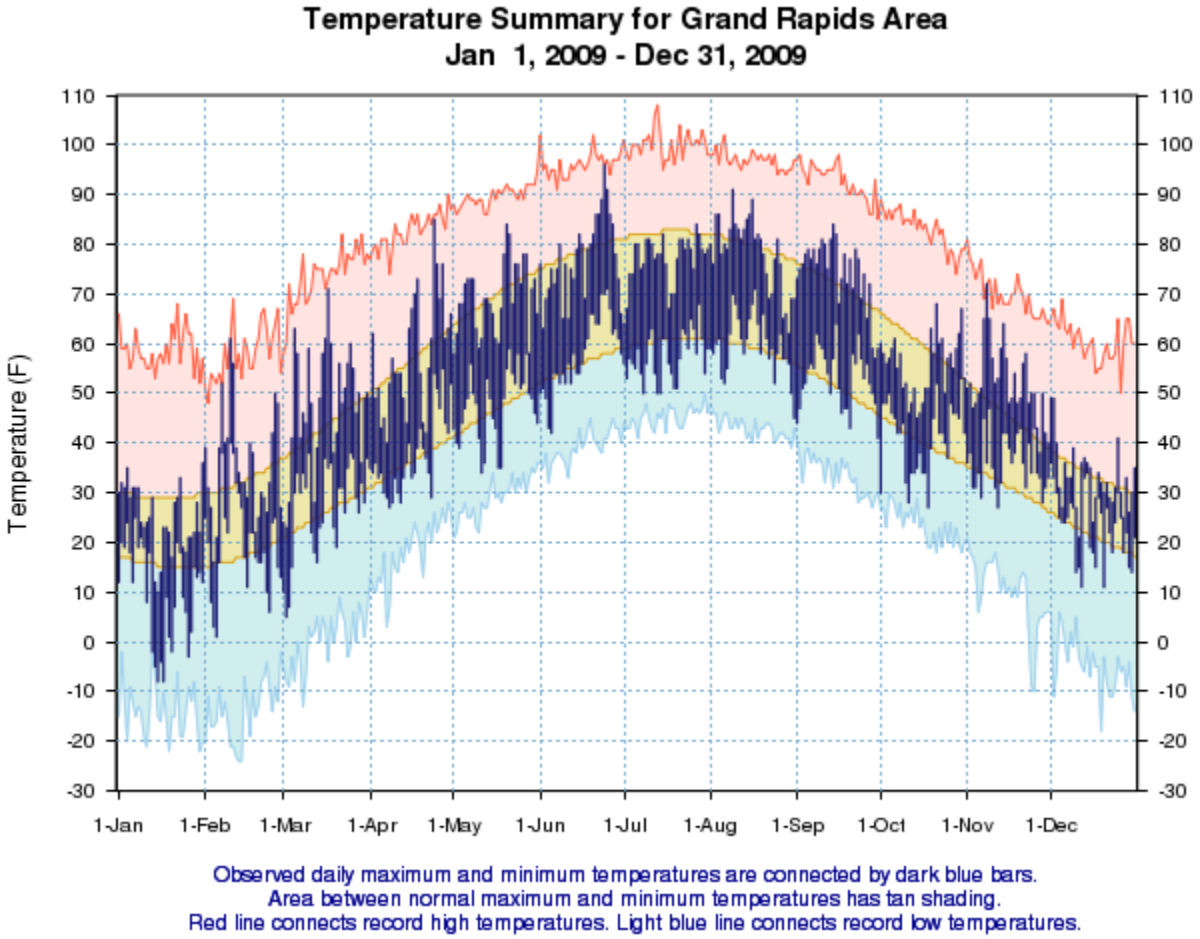

Figure 4. 2009 daily temperatures for Grand Rapids.

Daily features in the temperature can be seen in Figs. 4 through 6. The warm spike in the daily high temperature to near 60° on the 10th of February can be seen for Grand Rapids and Lansing. Muskegon only got to the mid 50s due to the cooling effect of Lake Michigan. The persistence of below freezing temperatures during January can also be seen. The colder than normal July and October stand out on all three charts. There was an unusually warm period in late April, where highs approached 80° at Grand Rapids and Lansing, and in the mid 70s in Muskegon. Note the lack of highs above 90° on any of these charts. The sharply colder weather beginning in early December is apparent as well.

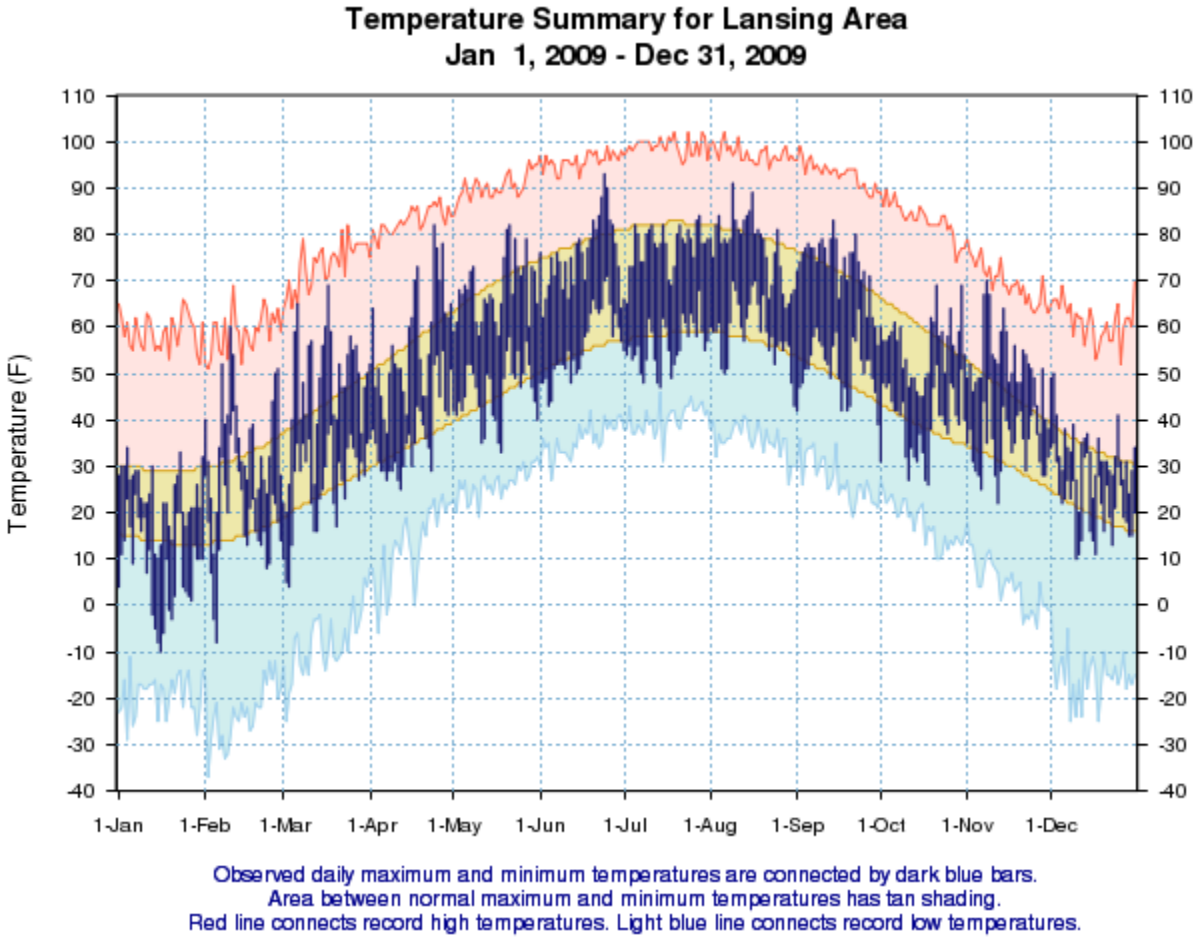

Figure 5. 2009 daily temperatures for Lansing.

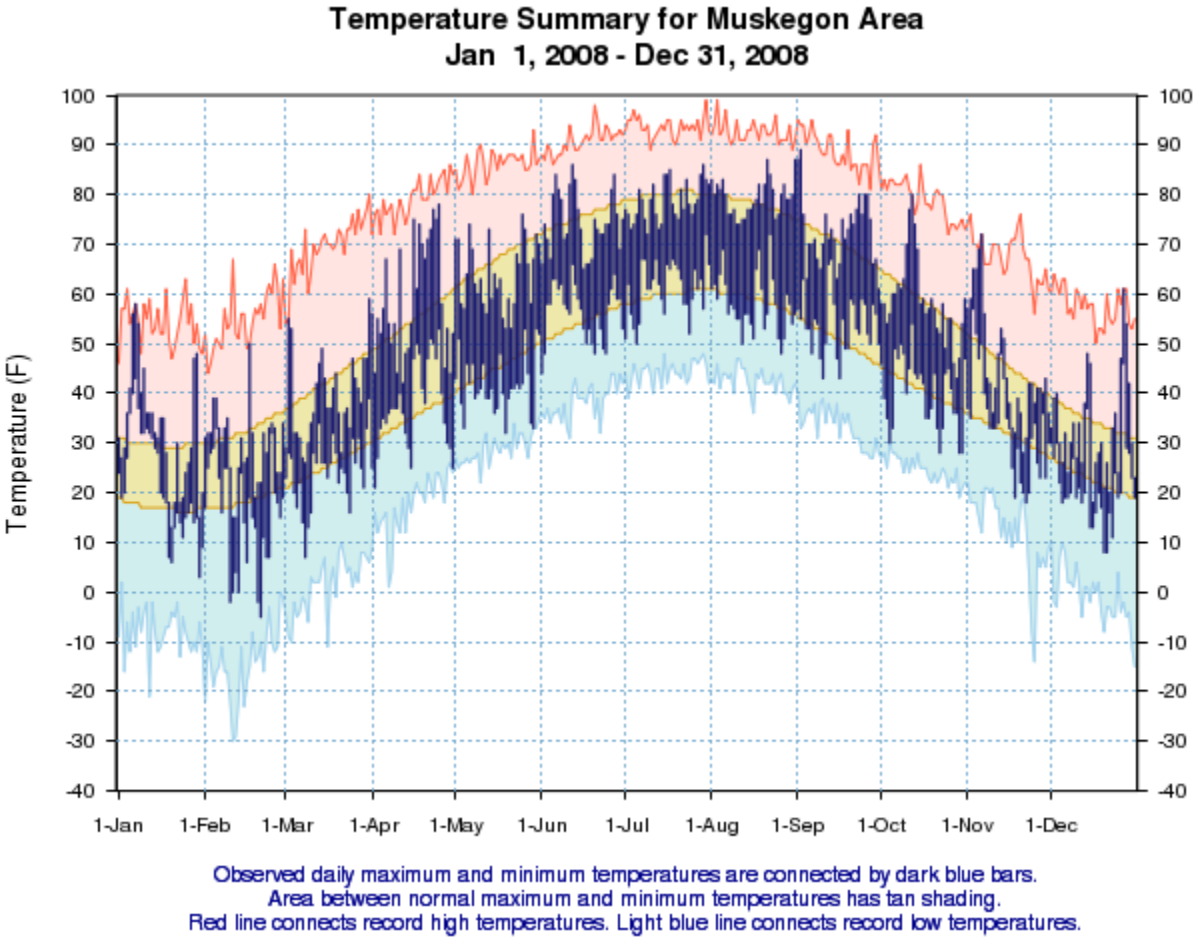

Figure 6. 2009 daily temperatures at Muskegon.

Precipitation Trends in 2009:

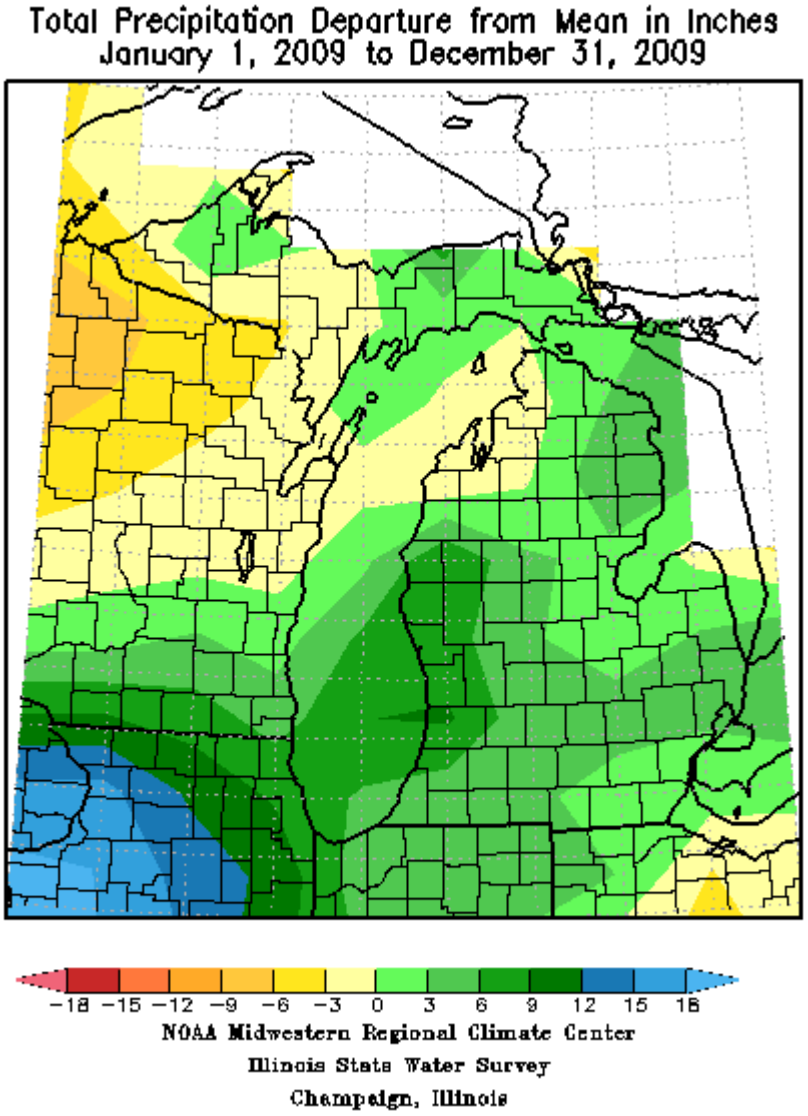

Figure 7. 2009 total precipitation departure from normal.

The year of 2009 was the second year in a row that was unusually wet. The western section of Southwest Lower Michigan received the heaviest precipitation relative to normal, while all of Lower Michigan was wetter than normal (Figure 7). Areas in northern Allegan County were over nine inches wetter than normal.

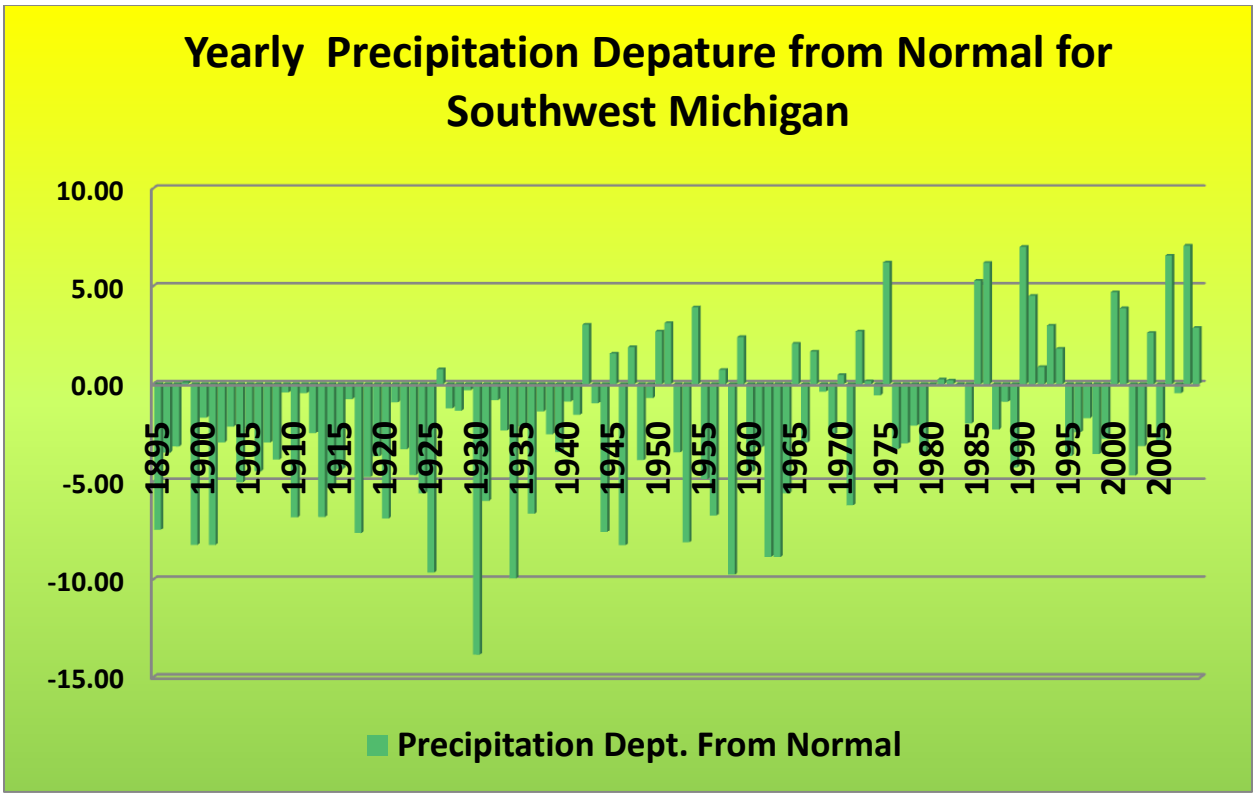

Figure 8. Yearly precipitation departure from normal based on all climate stations in Southwest Lower Michigan.

There has been a trend toward wetter years over Southwest Lower Michigan. This wetter trend started back in the 1940s (Figure 8). Prior to 1945, nearly all of the yearly totals for precipitation were below the 1971 to 2000 normal. The "dust bowl" years in the 1930s really stand out with four years more than five inches below normal.

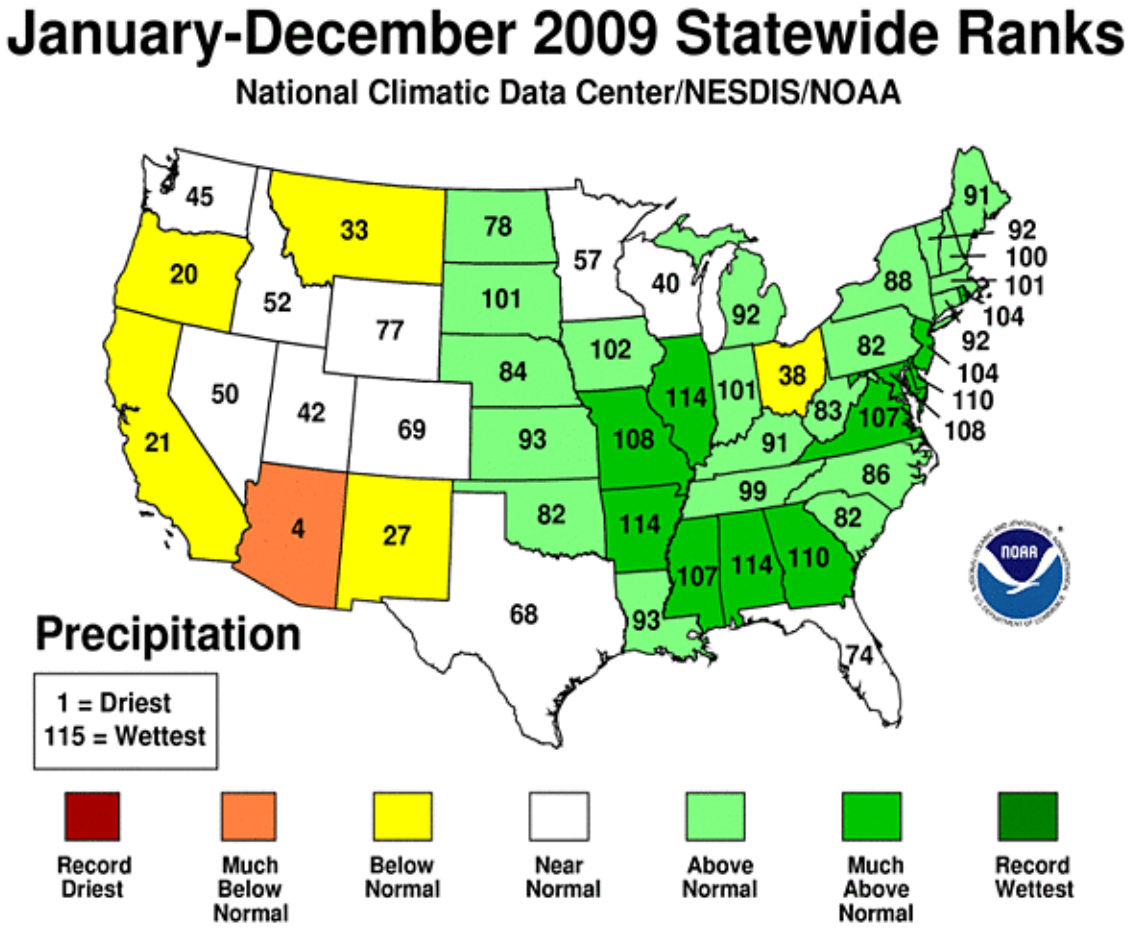

Figure 9. As in Figure 3, except for 2009 annual precipitation.

Michigan had its 24th wettest year since records began in 1895 (Figure 9). For Southwest Lower Michigan, this was the 14th wettest year on record. The wettest year for Southwest Lower Michigan was 2008 with a mean area total precipitation of 41.84 inches. Only four of the top ten wettest years occurred prior to 1990. The past ten years averaged 36.44 inches, which was 1.63 inches above the 1971 to 2000 normal of 34.77 inches.

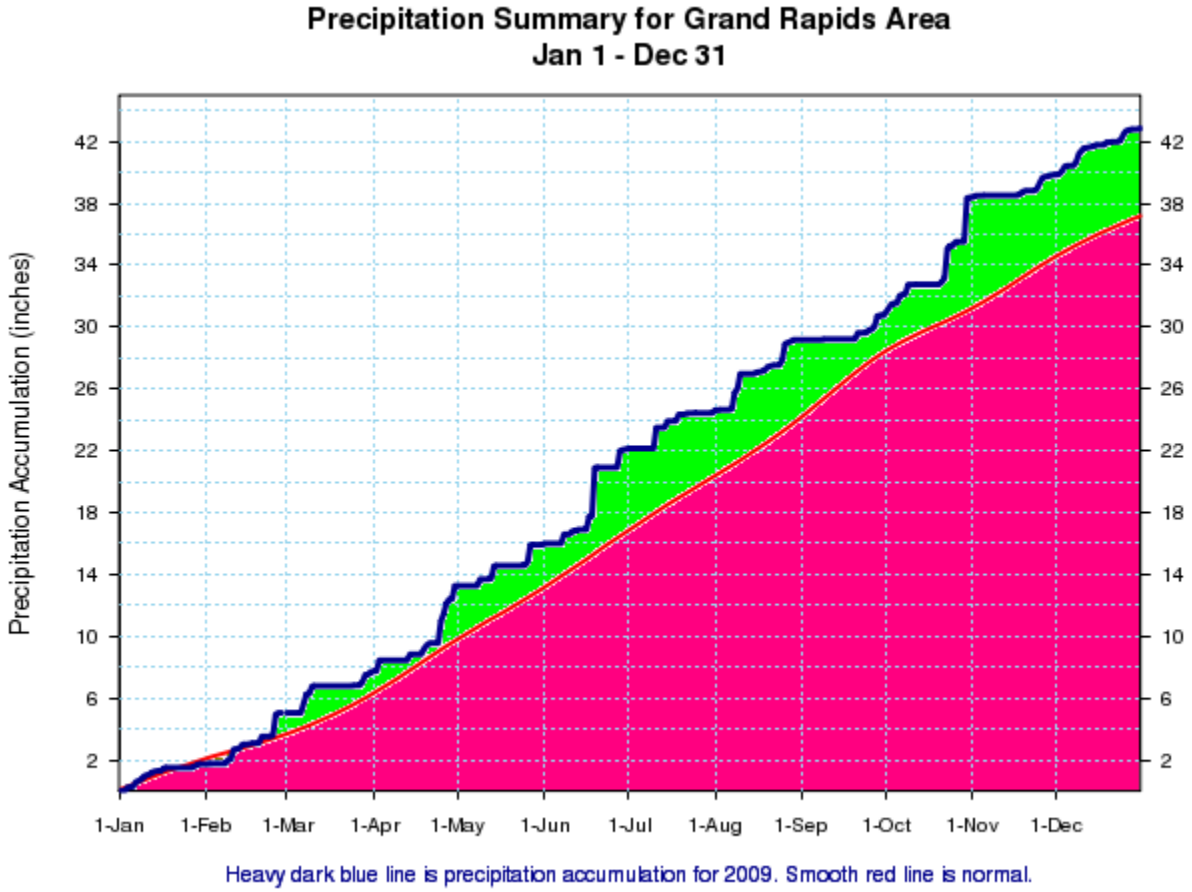

Figure 10. Grand Rapids 2009 accumulated precipitation. The fuchsia curve represents the normal accumulation, and the top of the green curve is observed precipitation.

Grand Rapids was wetter than normal throughout 2009 (Figure 10). With no area on the graph showing a sharp increase relative to normal, the wet trend continued through most of the year, once it got started in late February. This same trend can be seen for Lansing (Figure 11) and Muskegon (Figure 12).

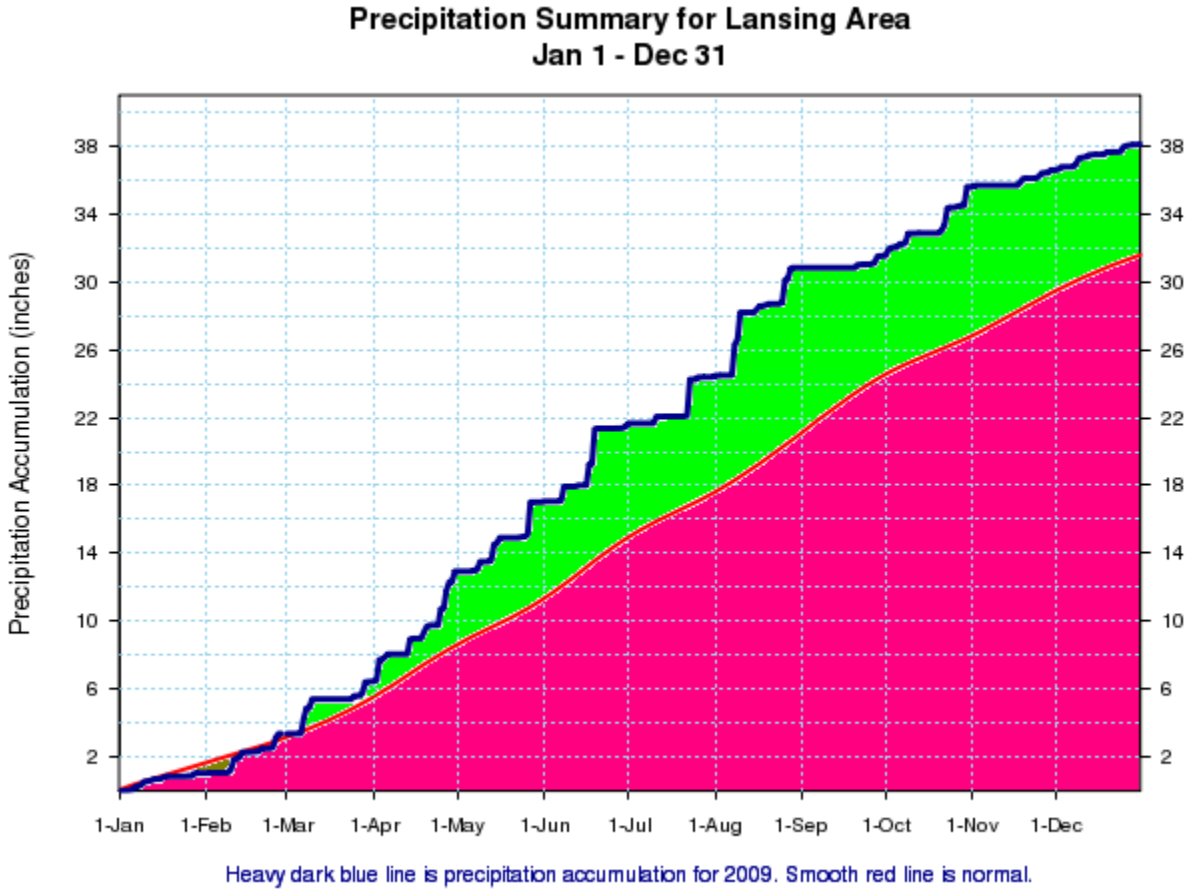

Figure 11. As in Figure 10, except for Lansing.

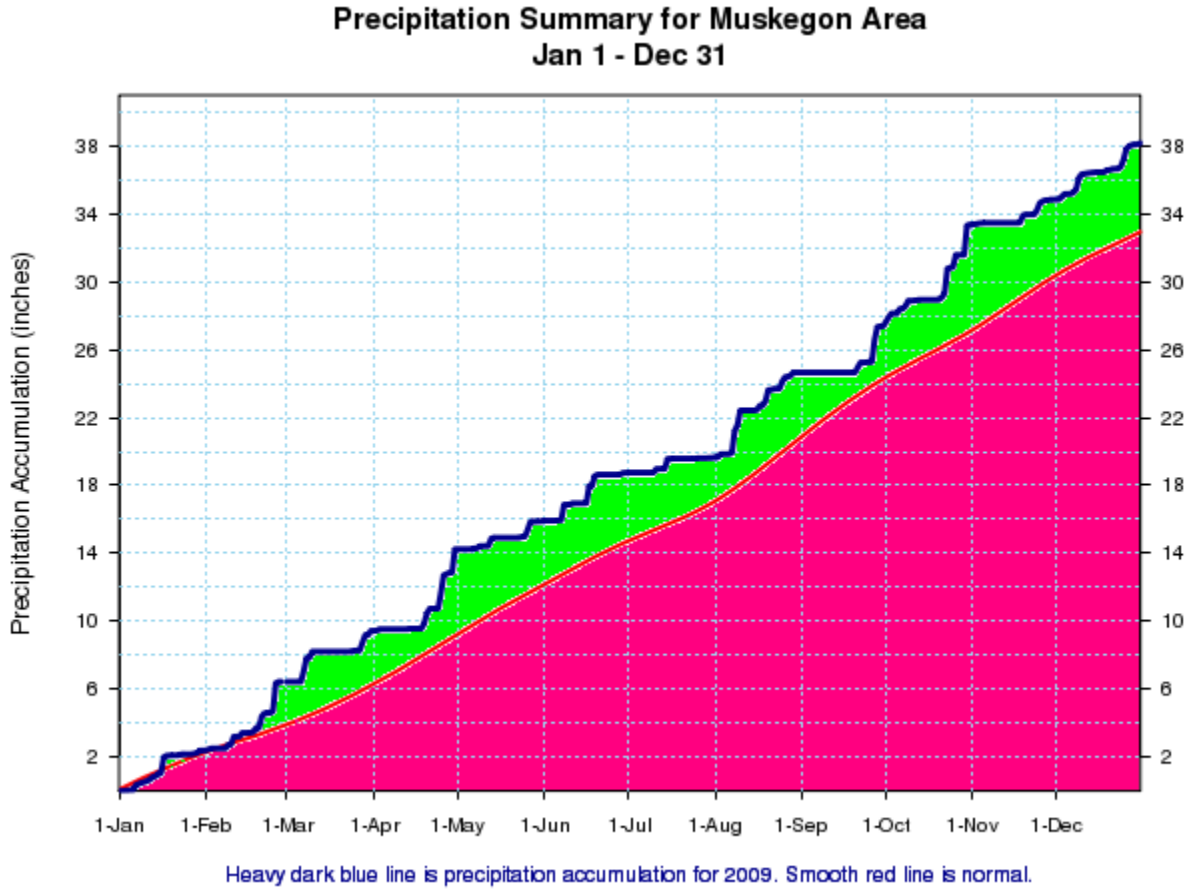

Figure 12. As in Figure 10, except for Muskegon.

Snowfall Trends in 2009:

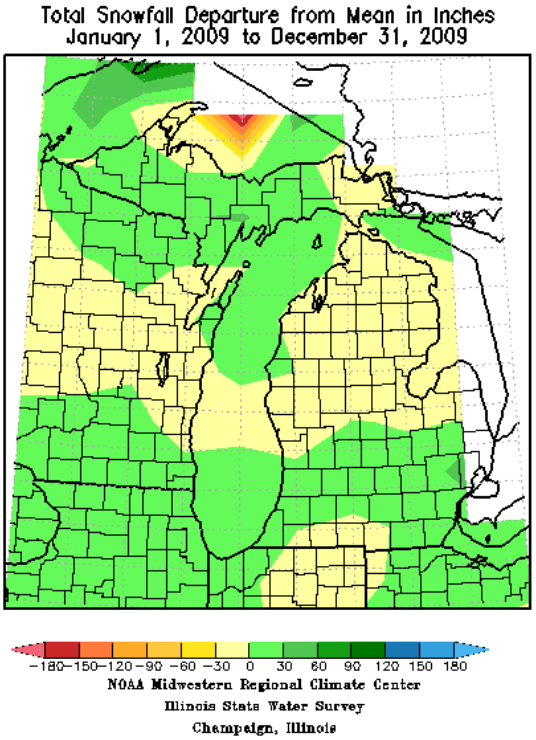

Figure 13. Total snowfall for 2009 for Michigan.

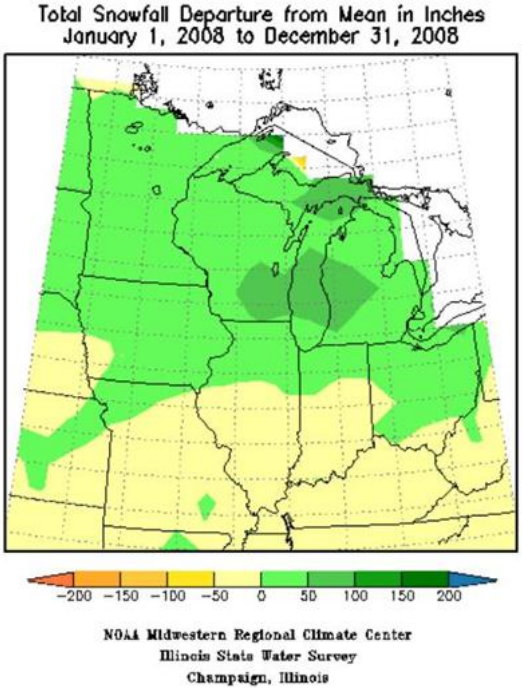

Figure 14. Year total snowfall departure from normal for 2008. Note different scale.

Severe Weather Trends for 2009:

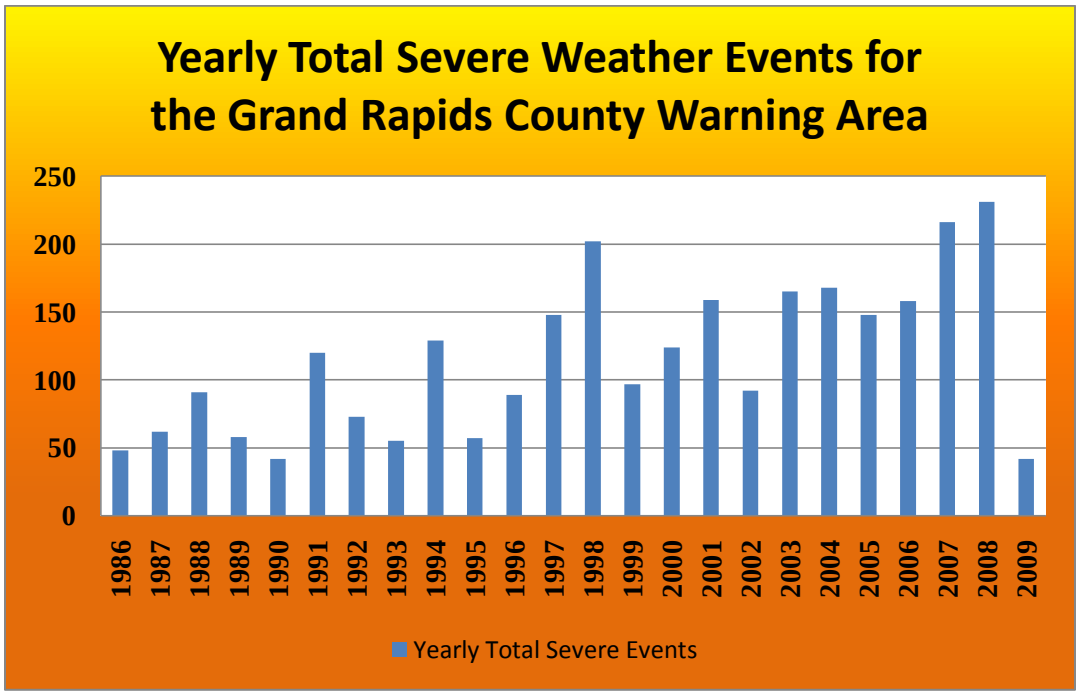

Figure 15. Southwest Michigan total yearly severe weather events from 1986 through 2009.

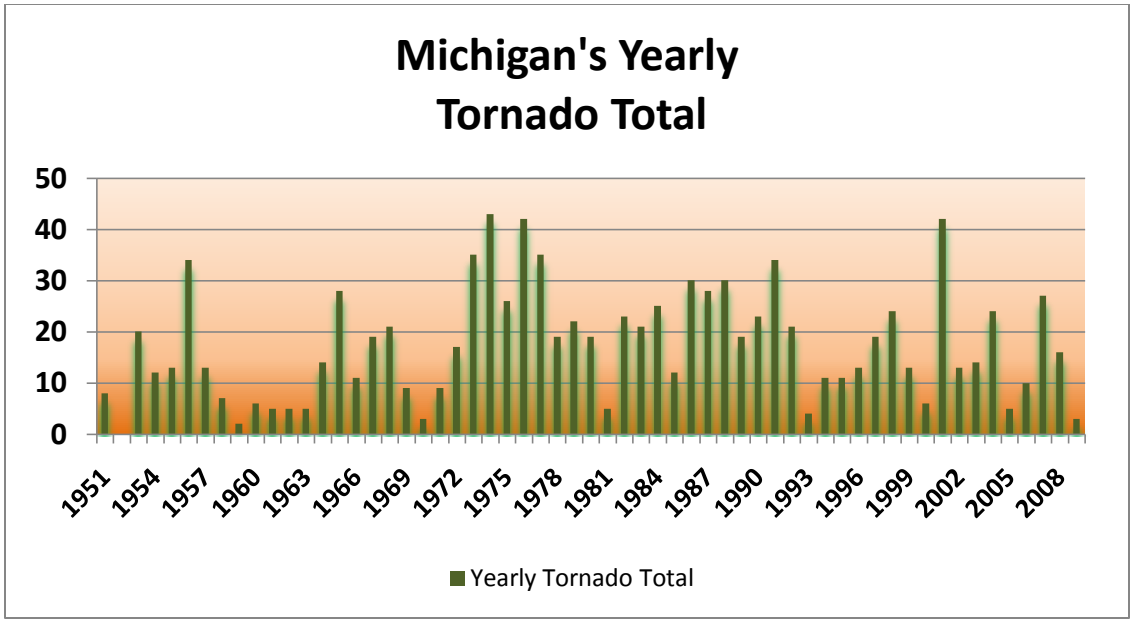

Figure 16. Michigan tornadoes from 1951-2009.

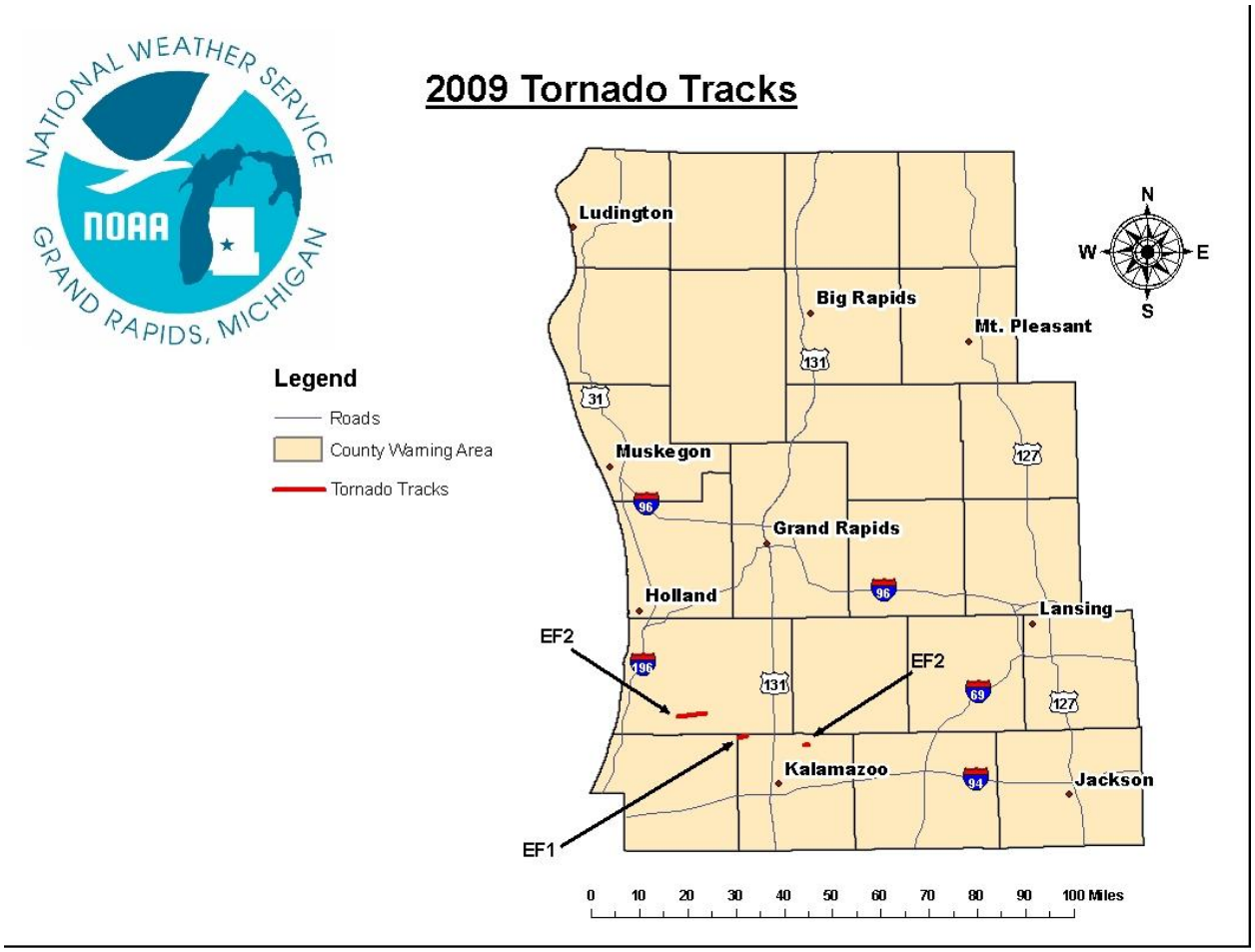

Figure 17. Tornado tracks for 2009.

There were 42 severe weather events in 2009 (Figure 15). The total of 42 severe weather events was the lowest total since 1990 when there were also 42 severe weather events. The average from 1986 through 2009 was 116 events per year. The 42 severe storm events in 2009 is about one third of the normal.

The total number of tornadoes in Michigan in 2009 was three (Figure 16). All of them occurred in Southwest Lower Michigan on June 19th during the late evening hours (Figure 17). The total of three tornadoes in 2009 was the lowest total since 1970. Only 1952, with no tornadoes and 1959 with two tornadoes had fewer tornadoes. In 1974 there were forty three tornadoes, which was the greatest total for a calendar year. The forty two tornadoes in both 1976 and 2001 are the second place holders for the most tornadoes in a calendar year in Michigan.

Top 10 Impact Weather Events of 2009:

1) June 19th - heavy rainfall caused fifty one million dollars in damage to both public and private structures in Ionia, Allegan and Ottawa County. Ten million dollars of that damage came from an estimated 1,400 cars flooded when the Grand River flooded the Ionia County Fairgrounds the next day during the B93 Birthday Bash. There were three tornadoes, in the evening, two EF2 and one EF1. The tornadoes caused significant damage to several homes, destroyed several barns, and snapped trees and telephone poles. The total damage from the tornadoes was estimated near $350,000.
2) August 9th - severe thunderstorm winds caused two and a half million dollars worth of damage with a 35 mile long, 9 miles wide swath of damage to homes, cars, trees and power lines. The towns of Grand Haven, Fruitport, and Sparta were particularly hard hit with strong winds.
3) December 8th through 10th – a snow storm brought 12 to 18 inches of snow and strong winds to 20 out of the 23 counties in Southwest Lower Michigan. Near blizzard conditions occurred during this event. There were numerous motor vehicle accidents. This storm brought the lowest pressure ever measured in Grand Rapids during the month of December, 28.87 inches at 9 AM on the 9th as the center of the storm passed overhead.
4) February 21st-22nd – a snow storm brought 6 to 10 inches of snow to 13 out of the 23 counties in Southwest Lower Michigan. There was a 50 car accident on Interstate 94 and near zero visibility in snow and blowing snow.
5) April 5-6th – a late season 6 to 10 inch snow storm over the Jackson to Lansing area brought numerous traffic accidents, trees and power lines down and caused power outages to around 50,000 homes and business.
6) January 17th - heavy lake enhanced snowfall and strong winds resulted in near blizzard conditions and ten to sixteen inches of snow west of US-131, with the heaviest snowfall near Ludington. Most of the rest of Southwest Lower Michigan had four to six inches of snow from the event.
7) April 25th through 28th - there was severe weather on the 25th, then several periods of heavy rain that brought flooding of rivers and streams to areas south of Interstate 96. Ten thousand dollars worth of property damage were reported during the severe weather event.
8) December 3rd and 4th - a lake effect snowstorm dumped 6-15" of snow from Grand Rapids to the lakeshore. The hardest hit areas extended from the northwest suburbs of Grand Rapids toward Marne, Coopersville, and other northern Ottawa County communities. Thundersnow bursts were reported with this impressive lake effect event.
9) October 29th-30th - 2 to 3 inches of rain fell over the southwest quarter of Southwest Lower Michigan. Minor flooding from overflows of some streams and smaller rivers were reported. Some roads were blocked due to flooding from clogged drains. Winds gusted to 40 to 50 mph causing some downed tree limbs.

10) October 22nd – 1 to 2.5 inches of rain fell to an area west of Grand Rapids and south of Muskegon. This set the stage for a minor flooding event on the 29th and 30th. There were numerous reports of minor flooding west of US-131 with this event.

Seasonal and monthly weather summaries are found at the National Weather Service Grand Rapids webpage (http://www.crh.noaa.gov/grr/climate/).